1873MNRAS..33R.421P

comment, that my remarks related. The following passage from a letter of Sir John Herschel's, bearing date May 11, 1870, will be interesting to Mr. Plummer. It relates to my objections to the theory of an atmosphere on the unseen part of the Moon :—"I believe your criticism on my theory" (I had not been aware that Sir John Herschel held the theory when I indicated objections to it) "is just. As for the water there can be no hesitation, —all the lunar oceans might readily subside into a basin 40 miles deep, and a hemisphere broad, without a chance of being seen by libration, but with an atmosphere anything like the Earth's, and only one-sixth the coercive power of gravity, some trace might certainly be expected to crop out at the border."

The slow change of density with elevation, owing to the small power of gravity at the Moon's surface, is a point which must be carefully considered in inquiries relating to a lunar atmosphere. It introduces an objection (fatal, I fear) to Mr. Plummer's ingenious theory.

There are some points in Mr. Plummer's reply which appear to me to be open to exception, but which I have not leisure to discuss so fully as I should wish. For instance, Newton's views as to the figure which would be assumed by a fluid moon are quite inconsistent with the hypothesis of a centre of gravity displaced 36½ miles from the centre of figure, as will be manifest to any one who examines Newton's reasoning. Next, the laws of equilibrium for fluids and liquids do not lead to so simple a result, in the case of an ellipsoid with an eccentric C. G., as Mr. Plummer indicates. Again, regarding the Earth (non-rotating) as a spheroid, with a displaced C. G., a fluid would not be in equilibrium when every point of its surface was equidistant from the Earth's centre of gravity. Mr. Plummer also appears to me to use the word *meniscus* with a more restricted significance than is, I think, usual. I may remark, lastly, that apart from all theory, the depth of the atmosphere, measured from the sea-level, is not "everywhere the same," but markedly less in high southern latitudes than in corresponding northern latitudes,—the difference being equivalent to that due to half a mile of elevation above the sea-level.

Note explanatory of a Stereographic Chart of the Transit of Venus in 1874. By R. A. Proctor, B.A., Cambridge.

This chart is intended to illustrate a relation to which Professor Adams called attention at the last meeting of this Society. If we disregard the rotation of the Earth during ingress or egress, and also neglect the curvature of *Venus's* shadow-cone where it crosses the Earth, it is manifest that the points where the shadow touches the Earth first and last at ingress, or at egress, are respectively antipodal, and may be regarded as the

Downloaded from http://mnras.oxfordjournals.org/ by guest on August 26, 2015

© Royal Astronomical Society • Provided by the NASA Astrophysics Data System

1873MNRAS..33..422P

poles of a series of circles of equal acceleration and retardation, of equal value therefore for applying Delisle's method. Moreover, these circles manifestly indicate a value proportional directly to their distance from the plane of the great circle having the before-mentioned points as poles. The intersections of these circles indicate points of a particular value for Halley's method, the excess or defect of duration being (i) the sum of the corresponding accelerations or retardations where each of two intersecting circles indicates a time difference of the same kind, or (ii) the excess of acceleration over retardation, or of retardation over acceleration where the time differences are of different kinds. It is readily seen that if points of equal value for Halley's method are connected, the connecting curves are a series of circles, having as poles the points midway between the poles of maximum retardation and those of maximum acceleration. Moreover, these circles, like those of equal value for Delisle's method, indicate values directly proportional to their distance from the plane of the great circle having these mid-points as poles.

In my chart the several curves corresponding to these circles have been drawn; but *all the corrections depending on the Earth's rotation during ingress and egress, and on the curvature of the shadow-cone, have been carefully taken into account.*

The dotted red* curves are those indicating the *loci* of points of equal value for Delisle's method, and the red curves indicate the *loci* of points of equal value for Halley's method. The actual accelerations or retardations in minutes, and the differences of duration, have been indicated in red letters.

The interpretation of the chart, and the regions indicated as suitable for the various methods proposed to be employed, will be manifest even on a very slight inspection of the chart.

Note upon the Figure and Diameter of Venus.

By John J. Plummer, Esq.

(*Communicated by the Rev. Professor Farrar, D.D.*)

The transit of *Venus* across the Sun's disk affords, as is perfectly well known, the best opportunity for determining the ellipticity of figure of that planet, and it has been very often looked forward to, in order to settle this question as well as the more

---

* As a rule, I prefer to have only one printing in a chart of this sort, where every line has been laid down with scrupulous accuracy, because the coloured lines may not be printed quite correctly. But in the present case, the map would have been overcrowded by black lines, unless red had been used. To learn the amount of error in 'registering,' it is only necessary to compare the red and black impressions of the small cross lines indicating the points of maximum acceleration and retardation.

Downloaded from http://mnras.oxfordjournals.org/ by guest on August 26, 2015

© Royal Astronomical Society • Provided by the NASA Astrophysics Data System